IN THE CLAIMS

1. (Original) A shower head for supplying a reaction gas to a wafer in a process chamber, the shower head comprising:

a plurality of plates comprising gas paths for supplying a reaction gas to a wafer; and

a cooling system comprising a plurality of coolant inlets and a plurality of coolant outlets formed in a lower one of the plurality of plates, and further comprising a plurality of inner cooling lines configured to connect each of the plurality of coolant inlets to one of the plurality of coolant outlets.

2. (Original) A shower head according to claim 1, wherein the plurality of coolant inlets and the plurality of coolant outlets are formed on a side of the lower plate.

3. (Original) A shower head according to claim 1, wherein at least four coolant inlets, at least four coolant outlets, and at least four inner cooling lines are formed.

4. (Original) A shower head according to claim 1, wherein the plurality of coolant inlets are formed on a first side of the lower plate, the plurality of coolant outlets are formed on a second side of the lower plate, and the plurality of inner cooling lines are formed parallel to each other.

5. (Original) A shower head according to claim 1, wherein a first coolant inlet is connected to a first coolant outlet by a first inner cooling line, wherein a second coolant outlet is connected to a second coolant inlet by a second inner cooling line, and wherein the second coolant outlet is located adjacent to the first coolant inlet on a first side of the lower plate.

6. (Original) A shower head according to claim 1, wherein a first coolant outlet is connected to a first coolant inlet by a first inner cooling line, and wherein the first coolant outlet is positioned approximately 90 degrees from a position of the first coolant inlet along an circumferential edge of the lower plate.

7. (Original) A shower head according to claim 6, wherein a second coolant inlet is located adjacent to the first coolant outlet, wherein the second coolant outlet is connected

to a second coolant inlet by a second inner cooling line, and wherein the second coolant outlet is located approximately 90 degrees from a position of the second coolant inlet along the edge of the lower plate, and wherein the second coolant outlet is located approximately 180 degrees from the first coolant inlet along the edge of the lower plate.

8. (Original) A shower head according to claim 1, further comprising:

a first outer cooling line arranged outside the lower plate to connect the plurality of coolant inlets; and

a second outer cooling line arranged outside the lower plate to connect the plurality of coolant outlets.

9. (Currently Amended) An apparatus for forming a thin film, said apparatus comprising:

a process chamber;

a heater stage located in a lower portion of the process chamber, said heater stage configured to support a wafer and to heat the wafer to a high temperature;

a shower head located in an upper portion of the process chamber, said shower head configured to supply a reaction gas to the wafer; and

a separating device arranged between a bottom of the process chamber and a bottom of the heater stage, said separating device configured to separate the heater stage from the bottom of the process chamber and to reduce a volume of processing space within the process chamber.

10. (Original) An apparatus according to claim 9, wherein the high temperature is about 500 °C.

11. (Currently Amended) An apparatus according to claim 9, wherein the separating device is located in a lower portion of the process chamber and contacts ~~a~~ the bottom of the heater stage.

12. (Original) An apparatus according to claim 9, wherein the separating device is configured to separate the heater stage and the process chamber by a uniform distance.

13. (Original) An apparatus according to claim 12, wherein the heater stage and the process chamber are separated by about 2-10cm.

14. (Original) An apparatus according to claim 9, wherein the separating device is formed of a heat-resistant material.

15. (Original) An apparatus according to claim 14, wherein the heat-resistant material is a ceramic material.

16. (Original) An apparatus according to claim 9, wherein the separating device is rim-shaped and is configured to closely adhere to the bottom of the heater stage.

17. (Original) An apparatus according to claim 9, further comprising:

a shaft installed beneath the heater stage and configured to raise and lower the heater stage; and

a shaft introduction portion configured to introduce the shaft at the bottom of the process chamber.

18. (Original) An apparatus according to claim 17, wherein shaft introduction portion is formed as a flexible bellows and has a length that varies as the shaft is raised and lowered.

19. (Original) An apparatus according to claim 9, further comprising a process chamber cooling system configured to cool a bottom surface of the process chamber whereon the separating device is located.

20. (Original) An apparatus for forming a thin film, said apparatus comprising:

a process chamber;

a heater stage arranged in a lower portion of the process chamber and configured to support a wafer and to heat the wafer to a high temperature;

a shower head disposed in an upper portion of the process chamber and configured to supply a reaction gas to the wafer, said shower head comprising a plurality of plates having a plurality of gas paths formed therein and a shower head cooling system arranged in a lower plate;

said cooling system comprising a plurality of coolant inlets, a plurality of coolant outlets, and a plurality of independent inner cooling lines for connecting each of the coolant inlets to one of the coolant outlets; and

a separating device arranged between the process chamber and the heater stage to separate a space beneath the heater stage from a process chamber space containing the wafer to reduce a process volume of the process chamber.

21. (Original) An apparatus according to claim 20, wherein the plurality of coolant inlets and the plurality of coolant outlets are formed along an edge of the lower plate.

22. (Original) An apparatus according to claim 20, wherein at least four coolant inlets, at least four coolant outlets, and at least four inner cooling lines are formed.

23. (Original) An apparatus according to claim 20, wherein the plurality of coolant inlets are formed on one side of the lower plate, the plurality of coolant outlets are formed on an opposite side of the lower plate, and the plurality of inner cooling lines are formed parallel to each other.

24. (Original) An apparatus according to claim 20, wherein a first coolant outlet is connected to a first coolant inlet by a first inner cooling line, wherein a second coolant inlet is connected to a second coolant outlet by a second inner cooling line, wherein the second coolant outlet is arranged adjacent to the first coolant inlet on a first side of the lower plate, wherein the first coolant outlet is located adjacent to the second coolant inlet on a second side of the lower plate, and wherein the second side of the lower plate is opposite the first side.

25. (Original) An apparatus according to claim 20, wherein a first coolant outlet is connected to a first coolant inlet by a first inner cooling line, wherein the first inner cooling line has a path that forms an approximately 90 degree angle, said angle having a vertex located at approximately the center of the lower plate.

26. (Original) An apparatus according to claim 25, wherein a second coolant inlet is located adjacent to the first coolant outlet, and wherein a second coolant outlet is connected to the second coolant inlet by a second inner cooling line, and wherein the second outlet is located approximately 90 degrees from the second coolant inlet along a circumferential edge

of the lower plate, and wherein the second outlet is located approximately 180 degrees from the first coolant inlet along the circumferential edge of the lower plate.

27. (Original) An apparatus according to claim 20, further comprising:

a first outer cooling line located outside the lower plate and configured to connect the plurality of coolant inlets; and

a second outer cooling line located outside the lower plate and configured to connect the plurality of coolant outlets.

28. (Original) An apparatus according to claim 20, wherein the high temperature is about 500 °C.

29. (Original) An apparatus according to claim 20, wherein the separating device is arranged in proximity to a bottom of the heater stage in a lower portion of the process chamber.

30. (Original) An apparatus according to claim 20, wherein the heater stage and the process chamber are separated by a substantially uniform distance using the separating device.

31. (Original) An apparatus according to claim 30, wherein the heater stage and the process chamber are separated by about 2-10 cm.

32. (Original) An apparatus according to claim 20, wherein the separating device is formed of a heat-resistant material.

33. (Original) An apparatus according to claim 32, wherein the heat-resistant material is a ceramic material.

34. (Original) An apparatus according to claim 20, wherein the separating device is rim shaped and is configured to closely adhere to a bottom of the heater stage.

35. (Original) An apparatus according to claim 20, further comprising:

a shaft configured to raise and lower the heater stage, said shaft arranged beneath the heater stage; and

a shaft introduction portion configured to contain the shaft at the bottom of the process chamber.

36. (Original) An apparatus according to claim 35, wherein the shaft introduction portion comprises a flexible bellows wall having a variable length depending on the raising and lowering of the shaft.

37. (Original) An apparatus according to claim 20, further comprising a process chamber cooling system arranged in thermal communication with a lower portion of the process chamber, said lower portion of the process chamber supporting the separating device.

38. (Withdrawn) A method for reducing processing time in a deposition process, said method comprising:

reducing a separation distance between a shower head and a heater stage;

reducing a dead volume in a process chamber; and

thereby reducing a volume of the process chamber and increasing the speed of a deposition process requiring repeated pumping and purging of a reaction gas.

39. (Withdrawn) A method according to claim 38 wherein reducing a separation distance between a shower head and a heater stage comprises supplying a cooling solution to a lower plate of a plurality of plates in the shower head.

40. (Withdrawn) A method according to claim 38 wherein reducing the dead volume in the process chamber comprises separating a processing space from a dead volume in the process chamber by providing a separating device between a bottom of the process chamber and a bottom of the heater stage.